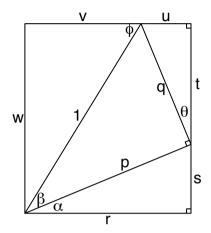
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Question 1

In terms of α and β , express all the lengths and other angle measures (θ and ϕ).



Variable	Algebraic expression
p =	CO2(B)
q =	Sin(B)
r =	xox(x)xor(3)
s =	Sim(x) cos(3)
$\theta =$	pprox
t =	$co2(\alpha)sim(3)$
u =	Sin (2) sin (3)
$\phi =$	
v =	202 (x+3)
w =	$Sin(\alpha+\beta)$

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Question 2

The angle-sum and angle-difference identities are true for any α and β :

$$\sin(\alpha \pm \beta) = \sin(\alpha)\cos(\beta) \pm \cos(\alpha)\sin(\beta)$$

$$\cos(\alpha \pm \beta) = \cos(\alpha)\cos(\beta) \mp \sin(\alpha)\sin(\beta)$$

You know the following:

$$\sin(315^\circ) = \frac{-\sqrt{2}}{2}$$
 $\sin(120^\circ) = \frac{\sqrt{3}}{2}$

$$\cos(315^{\circ}) = \frac{\sqrt{2}}{2} \qquad \qquad \cos(120^{\circ}) = \frac{-1}{2}$$

Determine $\sin(435^{\circ})$ exactly.

$$\Delta in \left(315^{\circ} + 120^{\circ}\right) = \Delta in \left(315^{\circ}\right) eol\left(120^{\circ}\right) + col\left(315^{\circ}\right) sin\left(120^{\circ}\right)$$

$$= -\frac{\sqrt{2}}{2} \cdot -\frac{1}{2} + \frac{\sqrt{2}}{2} \cdot \frac{\sqrt{3}}{2}$$

$$=\frac{5z+56}{4}$$

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Question 3

Prove that $\sin(2x) = 2\sin(x)\cos(x)$ for any x.

(Hint: start with an angle-sum formula from Question 2.)

$$\Delta in (\alpha + \beta) = \sin(\alpha) \cos(\beta) + \cos(\alpha) \sin(\beta)$$

Let
$$\alpha = x$$
 and $\beta = x$,

$$\sin(x+x) = \sin(x)\cos(x) + \cos(x)\sin(x)$$

$$sin(2x) = 2 sin(x) cor(x)$$

Question 4

Prove that $cos(2x) = 2cos^2(x) - 1$ for any x.

(Hint: start with an angle-sum formula from Question 2. Also, you will need to use the Pythagorean Identity $\sin^2(x) + \cos^2(x) = 1$

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$$\sin(x) + \cos^{2}(x) = 1$$
)

$$\cot(x + \beta) = \cot(x) \cot(\beta) - \sin(x) \sin(\beta)$$

$$\cot(x + \alpha) = \cot(x) \cot(x) - \sin(x) \sin(x)$$

$$\cot(x + \alpha) = \cot(x) - \sin^{2}(x)$$

$$\cot(x + \alpha) = \cot^{2}(x) - \sin^{2}(x)$$

$$\sin^{2}(x) = (-\cot^{2}(x))^{2}$$

Let
$$\alpha = \chi$$
 and $\beta = \chi$.

$$col(x+x) = col(x) col(x) - sin(x) sin(x)$$

$$col(2x) = col^2(x) - sin^2(x)$$

$$\sin^2(x) = (-\cos^2(x))$$

$$cos(2x) = cos^{2}(x) - (1 - cos^{2}(x))$$

$$cos(2x) = cos^2(x) - 1 + cos^2(x)$$

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Question 5

Prove that $\cos\left(\frac{y}{2}\right) = \sqrt[4]{\frac{1+\cos(y)}{2}}$. (Technically this assumes $\cos(y/2) > 0$, but let's not worry about that here.)

(Hint: use the identity proved in Question 4.)

$$xoa(2x) = 2xoa^{2}(x) - 1$$

Let
$$y=2x$$
, so $\frac{y}{2}=x$

$$cox(y) = 2 cox^2(\frac{y}{2}) - 1$$

$$1 + \cos(y) = 2 \cos^2(\frac{y}{2})$$

$$\frac{1+\cos(y)}{2}=\cos^2(\frac{y}{2})$$

$$+\int_{1}^{1+\cos(y)} = \cos\left(\frac{y}{z}\right)$$

$$\cos\left(\frac{y}{2}\right) = \pm \sqrt{\frac{1+\cos(y)}{2}}$$

Question 6

If you knew that $\cos(160^\circ) \approx -0.94$, then what is $\cos(80^\circ)$? Please set up an expression, but do **not** try to simplify or evaluate a decimal approximation.

(Hint: 160/2 = 80.)

$$lod\left(\frac{160^{\circ}}{2}\right) = \sqrt{1 + lod\left(160^{\circ}\right)}$$

$$\cos\left(90^{\circ}\right) = \sqrt{1 + (-0.94)}$$